

A COLLECTION OF SUB-FOSSIL BIRD AND MARSUPIAL REMAINS FROM KING ISLAND, BASS STRAIT.

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King Island lies at the western entrance to Bass Strait, almost midway between Victoria and Tasmania. A line of sounding, between the island and Tasmania, as laid down in the Admiralty charts, shows an average depth of thirty-two fathoms. The lowest is twenty, the highest forty-four, and the great majority range between thirty and thirty-five fathoms. A line between King Island and Cape Otway, on the Victorian coast, averages nearly forty-eight fathoms. The lowest is thirty-nine, the highest fifty-five.

The date of the formation of Bass Strait is a matter of doubts but it may in all probability be assigned to the Post Pliocene period.*

The fauna of Tasmania differs from that of Victoria partly in the absence of certain animals, such as the Dingo (*Canis dingo*) and the flying phalangers amongst the marsupials, and partly in the presence of others, such as *Thylacinus* and *Sarcophilus*, which are now extinct on the mainland of Australia. Such differences as exist between the fauna of Victoria, south of the Dividing Range, and that of Tasmania, may be regarded as due to the formation of Bass Strait, which resulted, during comparatively recent times, in the separation of Tasmania from the south-east part of Australia. Some idea of the nature of the land bridge that once stretched across between Victoria and what is now the island of Tasmania can be gained from a study of its remnants, as revealed to us in the chain of islands that stud both the western and the eastern margins of Bass Strait. The central part of the strait is open water, but on the eastern side a chain of islands, consisting in the north of smaller groups, such as the Curtis and Kent, and in the south the larger Furneaux group, lead across from Wilson's Promontory on the mainland to the north-east corner of Tasmania. On the west there is King Island, and close to the north-west point of

* Howitt, Presidential Address, Anthropol. Sect. Aust. Ass. Adv. Sci., Sydney, 1898, Vol. VII., p. 741.

Tasmania a group of smaller islands—Hunter Islands and the Hummocks. Between King Island and Cape Otway lies open water, with a curious and well-marked dipping invading the fifty fathom line, indicating in all probability the former existence of the estuary of a large stream that once ran southwards from the Victorian ranges. We may therefore safely conclude that the old land bridge was traversed in its north-western part by a river of considerable size, that its central part was comparatively low land,* and that this was bordered on the east by a chain of lofty hills. Across this central part a river probably ran northward to join the one flowing southwards near its estuary. On the western side, to the south of the estuary, was high ground, part of which is now represented by King Island.

In the early days of Australian settlement a few sealers and fishermen frequented King Island, but for long years it was practically deserted until, about thirty or forty years ago, an attempt was made to utilize it as a sheep run, but the existence of the poison weed (*Sarcocolla lessertifolia*) proved fatal to the scheme, and once more the island was abandoned. In November, 1887, the Victorian Field Naturalists' Club organized an expedition to the island. Its only inhabitants at that time were the lighthouse-keepers at Cape Wickham and Currie Harbor, and one solitary wallaby hunter. We had considerable difficulty in traversing the island, owing to the fact that its northern half was covered with dense scrub, and its southern part with impenetrable forest. During recent years the island has been occupied again, much of the scrub has been cleared away, and parts previously inaccessible have been opened up. On one occasion a large flock of sheep was placed on what is now known as the "sand patch," near to Stokes Point, the extreme south-western promontory of the island. At that time this particular part of the island was covered with grass, but the sheep eat this down to the roots, and, later on, "numbers of pigs, rooting about, turned up the soil and started a sand-blow, which now extends over some hundreds of acres. There is a dividing ridge running the length of the patch, and the sand shifts from one side of the ridge to the other with every change of wind. . . . It was during a strong westerly gale that I rode down to Surprise Bay. . . . Every few yards lay the bone of some animal in a more or less perfect state of preservation, and here and there the ground was covered with the petrified stumps and roots of old scrubs."†

The fact of the existence of these sub-fossil remains became known to Mr. H. H. Scott, the Curator of the Victoria Museum, Launceston, who placed himself in communication with Mr. J.

* Howitt, A. A. A. S., Sydney, 1898, Vol. VII., p. 758.

† Extract from a letter written to one of the authors by Mr. T. Alfred Stephenson, to whom we are indebted for valuable assistance.

McKie Bowling, the proprietor of that part of the island, and was instrumental in securing the first collection that was made. A short time afterwards Miss Dickson, of Hobart, visited the island, and was shown the fossil remains by Mr. Bowling. On her return to Hobart Miss Dickson brought the matter under the notice of the Royal Society of Tasmania, with the result that Mr. R. M. Johnston and the late Mr. Alex. Morton went across from Launceston, and, through the instrumentality of Mr. Bowling, were able to secure a series of specimens, which they kindly placed at our disposal for description. This collection included a considerable number of bones of an Emu, and, after a careful examination of the latter, they were described as the remains of a new species, to which the name *Dromæus minor* was given.*

The collection received from Messrs. Johnston and Morton included also skulls of a Wombat and *Dasynus*, and, in view of the importance of the remains as indicating the existence in the islands of Bass Strait of animals, such as an Emu and a Wombat, distinct from those of the mainland and Tasmania, we thought it advisable to make farther investigations, and, accordingly, one of us (J. A. Kershaw) went across to King Island, and spent some time there carefully collecting as much material as was available. Most fortunately for us Mr. Bowling was much interested in our work, and afforded us the most generous assistance, without which it would not have been possible for us to secure the large series of specimens that we now possess, and we take this opportunity of thanking Mr. Bowling for his invaluable aid.

The remains were chiefly distributed over the sand dunes on the extreme southern portion of the island.† The area covers some 300 acres in extent, and consists of a series of small ridges, the highest of which is on the south-east point. The sand is constantly being blown from one side or the other of these ridges, and the bones alternately exposed and covered. During the strong winds which prevail these are sifted out in considerable numbers, and lie distributed along the sides and in the trough of the ridges. Portions of the skulls, lower jaws, and limb bones of Wallabies were found mixed up with the leg bones of the Emu, skulls of Wombats and *Dasynus*, and here and there portions of the skeletons of both Seals and Sheep. Wallaby remains were by far the most numerous, and, though extremely fragile, fairly complete skulls could be obtained. Portions of the lower jaws were scattered about in large numbers along the sides of some of the ridges, which had recently been exposed to the action of the wind.

* "Victorian Naturalist," xxiii., p. 140 (1906).

† We are indebted to Mr. C. L. Barrett for the opportunity of illustrating the nature of these dunes.

Emu remains were scarce. Every bone that would bear handling was collected. Very diligent search was made for any portions of the skull or sternum, but although the whole area was carefully examined several times, but few fragments of skulls or sterna were found. Very incomplete portions of the sternum were occasionally found imbedded in the firmer soil beneath the sand, but every attempt to remove them resulted in their crumbling away. The remains of the eggs were frequently met with either in small fragments in the loose sand, or in patches imbedded in the firmer soil beneath. In one or two instances fully half the shell was found completely flattened out and fractured into small fragments, with the surface more or less removed by the action of the driving sand.

Exposure to the sun and rain had rendered many of the bones extremely fragile, so that when disturbed, however carefully, they broke into small fragments.

Fairly complete skeletons of Wallabies and one or two Emus were found lying in the more compact soil beneath the sand, but the most careful attempt to remove them again resulted in failure.

Although most of the remains were found on the extreme south point of the island, they were also met with on several parts of the west coast wherever a sand blow had started. Bones of Wallabies, Wombats, Emus, and Dasyures were found fairly numerous on an extensive sand blow near the Porky River, some 6 miles north of Currie Harbor. These were, however, less complete and much more fragile than those obtained from the south. That so many bones should be gathered together in one spot is doubtless to be attributed to the fact that in the early days, before the advent of the white man with his sheep, this area was one of the most fertile spots in the island, and was probably a much frequented and favourite feeding ground.

The collection contains remains of the following animals :—

1. *Dromæus minor*. Spencer.
2. **Tachyglossa aculeata*, var. *setosa*. Shaw.
3. **Macropus billardieri*. Desm.
4. **Macropus ruficollis*. Desm.
5. **Pseudochirus cooki*. Desm.
6. **Potorous* sp.
7. *Phascolumys ursinus*. Shaw.
8. **Phascologale minima*. Geoff.
9. *Dasyurus bowlingi*. Sp. n.
10. *Mus* sp.

Of these animals the six marked with an asterisk form part of the present fauna of the island, but their bones are intermingled under the sand dunes with those of the other three that are now extinct. We will deal at further length with these three.

DROMÆUS MINOR.

The original discovery of an Emu on the islands of Bass Strait was made in 1802. In December of that year Admiral Baudin in his exploring ships *Géographe*, *Naturaliste*, and *Casuarina* visited Kangaroo Island, so named by Flinders, though Baudin, unaware that he had been forestalled by the English navigator, called it île Decrès. Péron described the existence of large troops of Emus there. Three of them were brought back alive to Paris. One went to the Jardin des Plantes and two to the Chateau of Malmaison. The latter evidently found their way eventually to the Museum, as Viellot speaks of several Emus of small size living at his time in the Jardin des Plantes. The Museum now possesses two specimens*, (1) a skeleton labelled "Casoar de la Nouvelle Hollande, mort à la Ménagerie en Mai 1822, de l'île King, par Péron et Lesueur, expédition du Capitaine Baudin," (2) a stuffed specimen labelled "*Dromaius ater* V., Port Jackson, Australie, expédition du Capitaine Baudin," and bearing this further remarkable legend, "Casoar de la Nouvelle Hollande, *Casuarus Australis*, Lath., rapporté vivant de Port Jackson par l'expédition du Capitaine Baudin, mort en avril 1822—Le squelette est à l'anatomie." As Milne Edwards and Oustalet point out, the stuffed specimen certainly contains some bones, and as the skeleton in the gallery is complete the two specimens must represent parts of at least three birds. However this may be, both specimens certainly came from Kangaroo Island, and from neither King Island nor Port Jackson. The mistake with regard to King Island is all the more curious, because during Baudin's expedition the naturalists Leschenault, Bailly, Lesueur, and Péron were left stranded at Sea Elephant Bay, on the east coast of King Island, a strong gale forcing the ships to stand off from the land. Fortunately for them, they came across a few sealers who had settled in this out-of-the-way spot. The chief man amongst them, named Cowper, entertained the French naturalists in his quarters, and in addition to actually seeing two "Casoars" hanging up in his larder they subjected him to a close questioning, the questions and answers being set forth in great detail in a remarkable manuscript recently published by Messrs. Milne Edwards and E. Oustalet.† Cowper described the bird as possessing when young a greyish plumage that became quite black when the bird reached maturity;

* Notice sur quelques espèces d'oiseaux actuellement éteintes qui se trouvent représentées dans les collections du Muséum d'histoire naturelle, par M. A. Milne Edwards et M. E. Oustalet. Paris. 1893. Extrait du volume commémoratif du centenaire de la fondation du Muséum d'histoire naturelle, p. 63. For the opportunity of consulting this I am indebted to Professor E. C. Stirling.

† Note sur l'Emeu noir (*Dromæus ater* V.) de l'île Decrès. Bull. du Muséum d'histoire naturelle. 1899. p. 206. For the opportunity of referring to this I am indebted to R. Etheridge, jun., Esq.

its height was $4\frac{1}{2}$ ft.—that is less than the mainland form—it weighed 40 lbs. to 50 lbs. ; the male was slightly larger than the female, but there was not much difference; and, finally, Cowper informed his catechist that he had himself killed no fewer than 300 birds.

It is rather curious that the naturalists appear to have contented themselves with questioning Cowper, and apparently made no attempt to capture a specimen, which would have been a much more satisfactory manner in which to determine the nature of the bird.

For many years sealers and fishermen frequented King Island, and if many of them followed Cowper's example in regard to his wholesale slaughter of the bird, as doubtless they did, it is not at all surprising that the members of the Field Naturalists' Club, who visited King Island in 1887, found not a trace of the Emu at Sea Elephant Bay on the very spot where, eighty-five years earlier, the French naturalists had questioned Cowper.

In addition to the collection secured by Messrs. Johnston and Morton we have the extensive one made by one of us, and Mr. H. H. Scott, Curator of the Victoria Museum in Launceston, generously placed all of his material at our disposal. We have been in frequent communication with Mr. Scott, who has assisted us in every possible way, and we desire to record our special thanks to him.

The whole collection, upon which the following account is based, contains, apart from many others that evidently belong to decidedly immature birds, the following bones:—

1. Sixty-four femora.
2. Forty-one tibio-tarsi.
3. Seventy tarso-metatarsi.
4. Four pelves of which the total length can be measured, and parts of sixteen others.
5. Parts of six skulls.
6. One pectoral arch.
7. Portions of three sterna.
8. Fourteen fibulæ.
9. Ribs.
10. Vertebral bodies.
11. Toe bones.

1. *Femur.*

(Plate 2.)

The sixty-four femora vary in length from 186–130 mm. A mature *D. novæ-hollandiæ* measures 238 mm., and the length of that of *D. peroni* (= *D. ater*) is given as 180.*

* In his work on "Extinct Birds," (p. 235), the Hon. Walter Rothschild points out that Vieillot applied the specific name *ater* to Latham's *Casuarus novæ-hollandiæ*, and also that the same author makes no mention of Péron or the île Déerès. Mr. Rothschild has, therefore, proposed the specific name *peroni* for the extinct Kangaroo Island bird.

The following table is instructive as affording a good idea of the general size of the femur:—

Length.	180 and over.	170-180.	170-160.	160-150	150-140.	Less 140.
Number of specimens	2	13	20	19	6	4

Of the two longest, one measures 186, the other 180, but as will be seen, the great majority lie between 150-180. The collection evidently includes bones of birds of different ages, as the smallest ones (not included in the table) only measure 110 mm. Almost every one of those included in the table would, however, if found separately, be regarded as the bone of a well-developed bird. How far differences in size are sexual as well as age characteristics it is impossible to say, but when questioned by the French naturalists, Cowper, the fisherman, said that though the male was the larger the difference in size was not considerable. He also said that the bird reached maturity in one year. We may probably regard the two larger ones as decidedly above the average size of a mature bird, the femur of which would be more nearly 170 than 180 mm. So far as the structure of the bone is concerned, there is no difference save size between it and the corresponding bone of *D. novæ-hollandiæ*.

2. *Tibio-tarsus*.

(Plate 3. Figures 1-10.)

The whole collection includes 75 examples of this bone. The 41 that are included in the table of measurements vary greatly in length. In the original description the greatest length was given as 332. Out of the limited number then collected only two exceeded 320. In the large collection now available there are only four of this size, and they measure respectively 363 mm.* (?), 354 mm., 332 mm., and 328 mm. The general results of the measurements is given in the following table:—

Length.	Above 350	350-340	340-330	330-320	320-310	310-300	300-290	290-280	280-270	270-260
Number of specimens	2	0	1	1	4	6	3	12	10	2

It will be noted that two out of the series exceed by 23 mm. and 14 mm. respectively the length of the specimen of *D. peroni* in the Paris Museum. The number of specimens of the latter species that have been preserved is unfortunately so small that it is impossible to judge of the amount of variation in the size of the

* This is slightly broken.

bird. That considerable variation did exist is almost certain, judging from the measurements of adult mainland and King Island forms. Out of 42 apparently mature bones of the King Island bird, that is, bones in which the tibial and tarsal elements are firmly ankylosed, it would be rather curious not to find more than two representing those of normal full-sized birds, so that we are probably safe in concluding that these two especially long bones represent birds of abnormal size.*

We are inclined to think that the length of an average-sized mature male is between 300 and 320; that those in the table above this are exceptionally large specimens; that the large number measuring from 270-290 mm. in all probability are fully-grown females and males that are not fully grown. In the case of all those included in the 41 the bones appeared, however, to be mature, with the peroneal ridge well marked.

For the sake of comparison we have illustrated both the tibio-tarsus of *D. novæ-hollandiæ* and that of *D. peroni*.† The former is mature, and measures 446 mm. The latter is not mature, and measures only 276 mm. The Paris specimen measures 342. We have placed the Kangaroo Island tibio-tarsus by the side of a King Island bone of approximately the same length. A comparison of the two indicates the fact that the latter bird was evidently of considerably more robust build than the former. Messrs. Milne Edwards and Oustalet say that the tibia in *D. peroni* is quite straight, in contrast to the slightly curved bone in *D. novæ-hollandiæ*. In all tibio-tarsi from King Island, and in the Kangaroo Island bone, there is a slight but quite distinct curvature.

3. *Tarso-metatarsus.*

(Plate 4. Figures 1-12.)

The 70 specimens measured are not all of them mature bones. The lengths of those that are mature, that is, in which the tarsal element is firmly attached to the end of the metatarsal element, the tubercle for the tibialis anticus well marked, and the foramen completely enclosed, varies from 216 mm. to 292 mm. The largest presumably belonged to old males of exceptional size, the smaller to small females. On the other hand, there are quite immature bones measuring as much as 240 mm. in length. Out of the 70 specimens measured, one reached the length of 292 mm.,‡ and four others the lengths respectively of 278, 278, 277, and 271 mm. As shown in the table, the majority of measurements lie between 220 and 250 mm. There are 23 between 230 and 240, and 12 between 220 and 230, and the same

* See p. 17.

† For the opportunity of figuring this we are much indebted to Professor Stirling, Director of the South Australian Museum.

‡ Mr. H. H. Scott informs us that one of his specimens measures 294 mm.

number between 240 and 250. We are probably correct in regarding the length of an average mature tarso-metatarsus as being between 230 and 240 mm.

Above 290	280-290	270-280	260-270	250-260	240-250	230-240	220-230	210-220	200-210	190-200
1	0	4	2	2	12	23	12	11	1	2

In the following table are given the measurements of the femur, tibio-tarsus, and tarso-metatarsus of seven mature specimens of *Dromæus novæ-hollandiæ*, from which it will be seen that there is considerable variation in the size of the bones of the mainland form, though not so great as in the case of the island species:—

Bones of Dromæus novæ-hollandiæ.

	*	*	*	†	†	†	†
Femur	230	240	227	229	243	217	210
Tibio-tarsus	415	446	429	433	470	450	373
Tarso-metatarsus	375	395	388	394	411	335	340

In the following table we give side by side the lengths of the same bones in the three species, taking, in the case of *D. minor* and *D. novæ-hollandiæ*, bones that belong to fair, average-sized, mature specimens.

	<i>D. minor.</i>	<i>D. novæ-hollandiæ.</i>	<i>D. peroni.</i>
Femur	175	227	180
Tibio-tarsus	325	429	342
Tarso-metatarsus	235	388	290

4. *Pelvis.*
(Plate 4.)

There is a most striking difference in size between the pelvis of the mainland and that of the King Island bird, and fortunately, though the bones are very fragile, only one specimen retaining any appreciable part of the pubis and ischium, sufficient measurements can be obtained to warrant the separation of the two species on the evidence of this bone alone.

	<i>D. minor.</i>						<i>D. novæ-hollandiæ.</i>			<i>D. peroni.</i>
Length	276	274	292	...	...	249	440	442	420	340
Width in front		64	...	...	...	...	89	105	80	75
Width behind acetabular cavity	80	78	84	84	86	...	105	113	105	92

* Specimens in the National Museum, Melbourne.

† Specimens belonging to the Australian Museum, Sydney. We are indebted to Mr. R. Etheridge for the opportunity of measuring these.

‡ Measurements given by Messrs. Milne Edwards and Onstalet for comparison with those of *D. ater*. This specimen, presumably in the Paris Museum, can scarcely be full grown.

The first portion of a pelvis secured was obtained by Mr. Campbell, and presented by him to the National Museum. This by itself was too fragmentary and imperfectly preserved to base any decided conclusion upon. Indeed, in the absence of other specimens it could not be definitely stated whether it was an adult or a young one, but the structure of the 20 specimens now in our possession is decisive. As the table shows, there is a difference of 150 mm. between the length of the largest pelvis of *D. minor* and *D. novæ-hollandiæ*, and a difference of nearly 50 mm. between the former and *D. peroni*. Indeed, the latter appears to be intermediate in size between the two former.

5. Skull.

(Plate 6.)

As might be expected, remains of the skull are difficult to procure, and are of necessity more or less fragmentary, the fragile bones of the jaws being easily detached and broken. The complete fusion of the bones, and entire eradication of all sutural marks, show that the remains are those of quite mature birds; indeed, unless complete fusion of the bones had taken place, there would not be the slightest chance of the preservation of the cranium as a whole. The shifting of the sand, under which the bones lie buried, by strong westerly gales would soon dissociate the skull bones. In a young *D. novæ-hollandiæ*, with a length of 80 mm. between the frontal suture and the occiput—that is, much larger than the largest of the skulls of *D. minor*—the sutures between the occipital, parietal, and frontal bones are widely open, and during maceration the bones separate from one another. Instead of there being any chance that the skulls are those of immature or not fully grown birds, it may be regarded as absolutely certain that only perfectly mature skulls would have any chance of surviving the movements of the shifting sand.

Even more striking than the difference in size is that in the shape of the cranium of the island and the mainland form. The illustrations of the skulls seen in side-view in figures 5, 6 and 9, and the outline drawings representing the curvature of the upper surface of the cranium in two adult specimens of *D. minor* and two adult and one immature specimens of *D. novæ-hollandiæ*, show at a glance the great difference that exists in the cranial formation of the two forms. The outline drawings are life-size and in each case the horizontal line passes through the condyle posteriorly, and the suture of the frontal bone anteriorly.* The contrast

* The drawings were made by means of the Dioptograph, designed by Dr. Rudolph Martin, for the opportunity of using which we are indebted to Professor R. J. A. Berry.

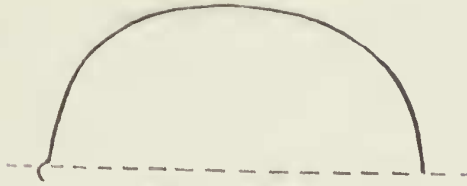


FIG. 1. *D. minor.*



FIG. 2. *D. minor.*

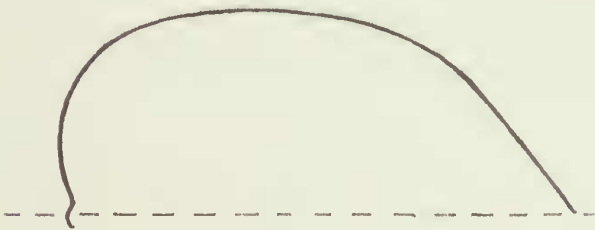


FIG. 3. *D. novæ-hollandiæ, juv.*



FIG. 4. *D. novæ-hollandiæ.*

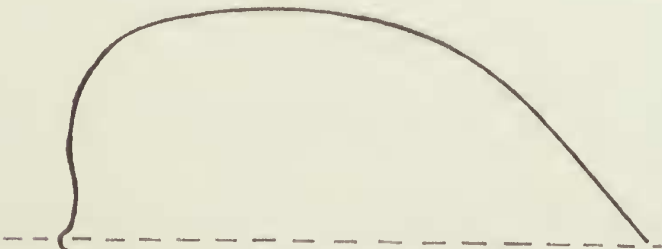


FIG. 5. *D. novæ-hollandiæ.*

between the dome-shaped skull of the island form and the frontally flattened one of the mainland form is strongly marked. It will be noted also that the dome shape of the cranium is indicated to a certain extent in the immature mainland form. The frontal region is certainly flattened, but the proportionate height of the cranium above a basal line running from the condyle to the frontal suture is decidedly greater than in the mature specimens. There is unfortunately no detailed description of the skull of *D. peroni* available, but if the dome shape of the cranium was anything like as well marked in the Kangaroo Island species as it is in that of the King Island bird, it could not have failed to attract attention. This character alone is sufficient to distinguish the King Island species from that of the mainland, and presumably also from that of Kangaroo Island.

In the following table we give (1) certain length measurements of the skulls and (2) the proportionate height of the cranium to the length of a basal line drawn from the condyle to the frontal suture, taking this line as 100:—

—	D. novae-hollandiae.			D. peroni.	D. minor.			
	ad.	ad.	juv.					
Occiput to frontal suture ...	90	91	80	80	58	62	58	..
Maximum width ...	75	76	62	62	66	54	56	...
Interorbital space ...	29	32	26	26	29	20	...	...
Length of premaxilla ...	84	70+	74	74	...	...	...	20
Proportionate height of skull	39	38	40	...	43	...	42	...

6. Pectoral Arch.

(Plate 4. Figures 19 and 20.)

Only one pectoral arch—that of the right side—has been found, and that has the clavicle missing, and about half of the scapular broken off. It is not perfect enough to found any comparisons upon.

7. Portions of three Sterna.

(Plate 7.)

It was found very difficult to secure remains of the sterna which broke up into powder as soon as they were touched. The fragment figured represents the greater part of it, but there is nothing apart from size to distinguish it clearly from the sternum of the mainland bird. The concavity on the inner or upper side is less accentuated, but then this is a feature in which the mainland form varies: one of our specimens being decidedly shallower and flatter than the one figured. The difference in size is, however, striking.

8. *Five Fibulæ.*

(Plate 3. Figures 11 and 12.)

These appear to differ only in size.

9. *Ribs.*

(Plate 4. Figures 16, 17, 18.)

Only two ribs were secured, and both of these are broken, The larger one corresponds to the first rib that meets the sternum. and the smaller one to the third. Both belong to the right side. The tuberculum of each is broken, and the capitulum is decidedly longer in proportion than in the corresponding rib of the mainland form.

10. *Vertebral Bodies.*

The collection includes forty-three vertebræ, but, so great has been the action of the wind-driven sand, that not one of them is entire. Apart from size, they do not apparently differ from those of the larger species.

11. *Toe Bones.*

(Plate 4. Figures 13, 14, 15.)

These are such solid parts of the skeleton that it might naturally be expected that they would be well represented, but only two could be found. Each of them is the proximal phalange of the large middle toe, and, apart from size, differs in no way from the same bone in the larger bird.

In the table we give the measurements, and, on the supposition that the first phalange of the median toe has the same relation to the length of the whole toe in the island as in the mainland form, we have calculated the probable total length of the toe, taking as a guide the length of the larger of the two bones, which evidently belonged to a mature bird:—

	D. novæ-hollandiæ.		D. minor.		D. peroni.
Total length of median toe ...	168	151	115-118	...	110
Length of 1st phalange ...	64	59	45	40	...

The measurement given of the length of the toe in *D. peroni* is 110, so that in this respect *D. minor* is somewhat larger than the former.

GENERAL REMARKS ON THE SPECIES OF DROMÆUS INHABITING
THE ISLANDS OF BASS STRAIT.

It is a matter of great regret that in the early days of Australian exploration so few specimens of the fauna of the islands of Bass Strait were preserved. We know now, when it is too late to do more than gather together—and that with difficulty—such remains as we can secure of their skeletons, that these islands were the home of a species of Emu distinct from that of the mainland of Australia, and probably also from that of Tasmania. The early inhabitants of the islands were naturally not in the least interested in natural history, save so far as the animals that they found inhabiting the primeval scrub were good to eat. Their only object was to capture as many seals and sea lions as possible, and whilst doing this they replenished their larder by exterminating as many birds and mammals useful for food as they could secure. Péron records the fact that on King Island Cowper and his associates had actually trained their dogs to go out by themselves and hunt down Emus and Kangaroos.* When they had killed their prey the dogs returned to camp, and, “par signes non équivoque,” announced their success, and then led the men to the places where their victims lay dead. On Kangaroo Island, by means of one dog trained by the English sealers, and presented to the French naturalists, the latter were able to capture twenty-seven Kangaroos alive, and numberless others that were killed and eaten. Péron says that Kangaroos are so easily killed by a trained dog that a few of these would not take many years to exterminate all the former on Kangaroo Island.

Péron also relates that the English fishermen had actually domesticated the Wombats, which went out during the day into the forests in search of food, and returned to their shelter huts at night.† We may be permitted to accept this statement with some reserve. Péron and his associates were very hospitably treated by the English sealers when they were in a very uncomfortable plight, owing to their ships having to stand off suddenly from the coast; indeed, if it had not been for Cowper and his friends the French naturalists would have had at least a very unpleasant time, so that naturally everything that they say about their rescuers and their surroundings is not likely to suffer from any lack of friendly and appreciative description.

If Cowper really domesticated the Wombat for the purpose of securing a ready food supply, then this is the first case on record of any such thing in regard to marsupials. How, in what must have been a relatively short space of time, he had trained them to

* “Voyage de découvertes, &c.,” vol. ii., p. 18.

† Loc. cit., vol. ii., p. 14.

go out in the day in search of food and return to their huts at night is a mystery. This means not only that he had persuaded the animals to abandon their burrowing habits, but, what is more remarkable still, he had changed a nocturnal into a diurnal animal. The domestication story must, we fear, be regarded as a myth. It is true that Flinders remarks on the fact that on Clarke Island he saw Wombats feeding during the day time. On the mainland the animal is also sometimes seen during the day, but it is essentially nocturnal in its habits, and Sir Everard Home states, in regard to one taken alive from King Island to London, that it was quiet during the day and active at night.

There is no doubt that Emus and Wombats were plentiful at the time of Péron's visit, and that Péron actually saw them. There is a very curious discrepancy between two accounts that are published dealing with their size. Péron makes the following statement* :—"Le puissant Casoar, haut de 16 à 22 décimètres (5 à 7 pieds)," and, in the margin opposite this, reference is made to plate 66. On the other hand, in the publication by Messrs. Milne Edwards and Oustalet, to which we have already referred,† the following question put to, and the answer to it made by, Cowper, are given :—

"6. Quelle est la hauteur la plus grande à laquelle il parvient ?

A l'île King, à peu près 4 pieds $\frac{1}{2}$, plus petit qu'à Sydney."

The plate referred to contains the figures of adult and young birds, and bears the following legend :—"Nouvelle-Hollande—île des kanguroos. Casoar de la N^{elle}. Hollande (Casuarins Novæ Hollandiæ-Lath.)" It will be noted that in the letterpress the name île Decrès is used, and on the plate the name île des Kanguroos. It is evident that Péron imagined that the island and the mainland forms of Emu were the same, and that he made very little effort to capture them on the islands—indeed, he says, speaking of Kangaroo Island, "Nous mêmes peu de soin à les chasser, nous ne pûmes nous en procurer que trois individus vivans."‡ He makes no remarks whatever about the size of the Kangaroo Island specimens.

It is well known now that there are three authentic specimens of *D. peroni* in existence§—a mounted skin and skeleton in Paris and

* "Voyage de découvertes, &c.," vol. ii., p. 14

† "Note sur l'emu noir, &c., Bull. du Muséum d'hist. nat.," 1899, p. 206.

‡ Loc. cit., p. 78, vol. ii.

§ Hon. Walter Rothschild. "Extinct Birds." 1907. Also Dr. H. H. Giglioli. "Nature." April 4, 1907, p. 534. A very good account of the various specimens brought to Europe is given by Graham Renshaw in the "Zoologist." No. 741, 1903. p. 81.

a skeleton in Florence.* These three are undoubtedly those taken from Kangaroo Island by Bandin's expedition. In addition there is the doubtful specimen discovered in Liverpool by Dr. H. O. Forbes, in regard to which the Hon. Walter Rothschild says †—"In addition to Deerès or Kangaroo Island, also Flinders, King Island, and Tasmania had Emus living on them at the time of Péron's visit, and I believe, if authentic specimens from these localities were in existence, we should find that each of these islands had had a distinct species or race of Emus. Taking this for granted, and also taking into account that it is slightly different from the type of *D. peroni*, I have come to the conclusion that the Liverpool specimen is an immature, though full grown, individual from one of these other islands; but it is not possible from this one rather poor specimen to separate it from the Kangaroo Island species, especially as there is absolutely no indication of the origin of this specimen." The only other remains of the Kangaroo Island Emu are two bones, one a tibio-tarsus and the other a tarso-metatarsus, of which, through the courtesy of Professor E. C. Stirling, the Director of the South Australian Museum, we are able to give illustrations.

Dr. Giglioli is of opinion that the Liverpool specimen is identical with the Paris and Florence specimens. Most unfortunately, there is no evidence whatever of where it came from or by whom it was collected. A few bones from King Island were also sent to Dr. Giglioli by the late Mr. Alex. Morton, and while pointing out the necessity of securing a larger series of bones from the islands Dr. Giglioli expressed the opinion that the King Island specimens belonged to *D. peroni*.

With the comparatively large series of bones now available it is possible to form a tolerably correct idea of the average size of the King Island bird. Unfortunately, we have only the measurements of the bones of one specimen of *D. peroni*, but we have the advantage of knowing that this was full grown, as it lived for some time after its arrival in France either at the Jardin des Plantes or at the Chateau of Malmaison, and we may therefore regard it as probably an average sized specimen—more especially as there does not appear to be any great discrepancy in size amongst the Paris and the Florence specimens.

* In his "Catalogue of the Fossil Organic Remains, Mammalia, and Birds contained in the Museum of the Royal College of Surgeons," London, 1815, p. 353, Owen makes the following statement in regard to specimen No. 1563: "A corresponding section of the spinal canal for the enlargement of the chord whence the nerves of the legs originate, and the more marked difference in the form and proportions of the iliac plates, especially behind the acetabulum." In his work on "The Extinct Wingless Birds of New Zealand" he also figures, in Plate xxxv., fig. 7, a sternum to which he applies the name of *Dromaeus ater*. No reference to this particular specimen nor any reference to the species is made in the letter-press. It seems clear that Owen is not using *ater* as a synonym for *noisi-hatua*, because the latter specific name is applied to specimens figured in Plates xxxi. and xxxvii.

† "Extinct Birds," p. 235.

SUB-FOSSIL REMAINS FROM KING ISLAND.

In the following table we give the measurements of the bones of six specimens of *Dromaeus novae-hollandiae*, of the large series of the King Island form, and the measurements of the one specimen of *D. peroni*. In the case of the King Island form we have given three series of measurements—the minimum, the maximum, and those between which lie the great majority of the measurements. Thus, for example, in the case of the femur the minimum of mature bones is 140 and the maximum 186, but whilst only 2 specimens measure more than 180 and 6 less than 150 mm., no fewer than 52 measure between 150–180 mm., and of these 30 measure between 150–170 mm.

Species.	D. novae-hollandiae.	King Island Species.	D. peroni.
Skull, length	90–91	58–62	80
„ width	75–76	51–56	66
Femur	217–243	140, 150–180, 186	180
Tibio-tarsus	415–446	265, 270–320, 363	342
Tarso-metatarsus	335–411	216, 220–280, 292	290
Pelvis, length	440–442	249–292	340
Pelvis, width in front	80–105	64	75
Pelvis, width behind	105–113	78–84	92

It will be seen that there is considerable variation, not only in the case of the King Island species, but also in that of the mainland species, and doubtless a corresponding amount of variation would be found to exist amongst the Kangaroo Island birds if only we were fortunate enough to possess as large a series of their bones as we do of those of the King Island Emus. It is, for example, almost certain, or at least quite probable, that amongst the Emus of Kangaroo Island there were many adult birds that exceeded the measurements given in the above table, and many that fell below them unless the three specimens secured happened to belong to birds of either maximum or minimum size.

One very striking fact in regard to the Ratitæ is that on insular areas we find a most remarkable development of distinct species, and that on continental areas there is a widespread distribution of a limited number of species.

Throughout the whole of the South American continent we find only three species of Rhea. Africa has only three species of *Struthio*.

Throughout the whole of Australia there is only one species of Emu*. Six living species of *Apteryx* are recognised on the islands of New Zealand, where there also exist the remains of at least twenty species of *Dinornis* and closely allied genera. In Australia there is only one species of Cassowary; on the Papuan Islands to the north there are no fewer than ten species, and of these one species may be confined to one island, as in the case of the well known Ceram Cassowary, or several may occur on the same island as in the case of New Guinea.

It is thus apparent that for some reason or another an insular environment is associated with considerable variation amongst Ratite birds. It would not therefore be a matter of surprise, judging by what has taken place in the case of the Ratite birds of New Guinea and the surrounding islands to the north of Australia, if King and Kangaroo Islands and Tasmania each possessed its own species of Emu.

The measurements in the table given above indicate very clearly the fact that the King and Kangaroo Island Emus were quite distinct from those of the mainland. Of this there can be no doubt whatever. There now remains the question of the identity or otherwise of the two former. Despite the fact that in the case of the femur, tibio-tarsus and tarso-metatarsus our collection from King Island includes in each case one or two bones equal in length to the corresponding bones in the Paris specimen from Kangaroo Island, it is clear that these belong to exceptionally large specimens, and that the average size of these bones was considerably less than the maximum given in the table. The two bones from Kangaroo Island also indicate the fact that the species of Emu inhabiting the latter was of decidedly less robust build than that of King Island. Not only is this so, but the measurements of the skull and pelvis are quite sufficient to distinguish the two species.

Both the King Island and the Kangaroo Island species were distinguished by their dark colour from that of the mainland.

We have now to deal with the question of the Tasmanian Emu. At the present time no Emu is extant in the island, but names such as Emu Bay and Emu Plains evidently indicate the fact that when the island was first occupied by white men, and probably for many years afterwards, Emus did exist. The only examples of the Tasmanian Emu of which we can find any record are two skins of adult birds presented to the British Museum by Mr. Ronald Gunn, and recorded by Gray in his *List of Birds in the British Museum*, iii., p. 54, 1844, and again by Salvadori in the *British Museum Catalogue of Birds*, xxvii., 1895.

* *D. irroratus* of N.W. Australia is doubtfully distinct from *D. novæ-hollandiæ*.

In 1804, the Rev. R. Knopwood wrote a diary of his visit to Tasmania when H.M. ship *Calcutta* sailed from Port Phillip to the Derwent River in Tasmania.* On Wednesday, 7th March, he has the following record in his diary—"We see Kangaroos, Emews, Pigeons, and Parrotts"; again, on Monday, 26th March, he says—"They caught six young Emews, about the size of a turkey, and shot the old mother;" and, on 9th October, he records the capture by his dogs of an "Emew 60 lbs. weight."†

Bischoff,‡ writing in 1832, and quoting from "An Account of Van Diemen's Land," published by Widowson, in 1829, says—"The birds that may be called game are very numerous, with the exception of the Emu or Native Ostrich, they very much resemble the latter bird, and are very nearly as large." In the "Van Diemen's Land Anniversary and Hobart Town Almanac," for the year 1831, the "Emu or Cassowary Rhea Novæ-Hollandiæ," is included in "A glossary of the most common natural production of Van Diemen's Land," so that evidently the bird was well known at this early date.

The Emu is known to have existed in large numbers in Tasmania up to at least the year 1840. Col. W. V. Legge,§ the distinguished ornithologist of Tasmania, states that during the "forties" the birds inhabited and bred regularly in a locality known as Kearney's Bogs, about 12 miles south of Avoca, amongst the ranges of the east coast. He states that one of the shepherds "used not unfrequently to bring eggs to the house."

Mr. D. Le Souëf, in his notes on the extinct Tasmanian Emu,|| mentions that Mr. Ransom, of Killymoon, in the Fingal district, remembers Captain Hepburn, of Roy's Hill, finding an Emu's nest with eight or nine eggs. A little later these were hatched under a turkey hen. From these others were bred, and a pair of them were given to the late Baron von Steiglitz, of Killymoon, one of which survived until 1873, when it was drowned while trying to cross a flooded river. With its death, the Tasmanian Emu, Mr. Ransom believed, became extinct.

Gould, in his "Birds of Australia," published in 1848, states that Emus were then almost extirpated in Tasmania; a few still ranging over the western part.

* We are indebted to Mr. J. J. Fletcher for much valuable assistance in regard to the early literature dealing with the Emu and Phascolumys.

† "Journal of the Rev. Robert Knopwood, A.M.," in "Historical Records of Port Phillip," edited by John J. Shillinglaw, p. 65.

‡ Sketch of the History of Van Diemen's Land, &c. James Bischoff, 1832.

§ "Emu," iii., p. 239, 1904.

|| "Emu," vi., 1907, p. 116.

Mr. Geo. T. Lloyd* writing in 1862, says, "The Emu of Tasmania, as I have before stated, is much smaller and darker in plumage than that of Australia; but, never numerous there, that noble bird is now nearly extinct."

One difficulty in regard to the safe identification of the true Tasmanian Emu lies in the fact that at a comparatively early date specimens were introduced from the mainland. Mr. D. Le Souëf states, on the authority of Mr. Stephens, that one or more were imported from Victoria by Mr. James Cox, of Clarendon, in the early "fifties," and others were introduced somewhat earlier.

Further evidence of this is afforded by Mr. R. Gunn,† who, writing in 1851, says that he obtained two Emus from the Horticultural Gardens in Hobart, and adds "they were originally from a Port Phillip stock, but brought up in Van Dieman's Land." He goes on to say, "a leg of a Tasmanian Emu is now in my possession, and so far as I can judge from it, as a very imperfect specimen, there are differences in the arrangement and size of the scales, which may justify the separation of the Tasmanian Emu from that of New Holland." In a foot-note, Mr. J. Milligan adds that, "Captain Hepburn, of St. Paul's Plains, possesses a breed of Tasmanian Emus, which he succeeded in rearing from eggs found many years since upon the high healthy land in his vicinity."

Two eggs have been recorded as those of the Tasmanian Emu, one of which is in the collection of Mr. J. W. Mellor, of Adelaide, and the other in that of Mr. D. Le Souëf, Director of the Zoological Gardens, Melbourne. Both are said to be considerably smaller than those from the mainland. The measurements given by Mr. Le Souëf are 4.85 x 3.40 inches and 4.80 x 3.50, as compared with 5.56 x 3.63 inches of a typical egg of a mainland form. A bone found by Mr. H. H. Scott in a limestone quarry was sent to Mr. D. Le Souëf, who identified it as the femur of an Emu smaller than those from the mainland, but too damaged to be of any value.

Finally, during a recent visit to England, Mr. D. Le Souëf examined the two skins of the Tasmanian Emu in the collection of the British Museum, and arrived at the conclusion that they were distinct from those of the mainland, a conclusion in which he informs us he was confirmed by the Hon. W. Rothschild, Dr. Bowdler Sharp, and Mr. Hartert, who also examined them.

On the evidence derived from the size of the egg Mr. Le Souëf proposed the name of *Dromarvus diemensis* for the Tasmanian bird that laid it, but exactly what this bird was it is now quite impossible to say with absolute certainty. Presumably, however, granting that the eggs are those of the true Tasmanian Emu, and

* "Thirty-three years in Tasmania and Victoria," p. 62, 1862.
 † R. Gunn. Proc. R. S. Tas., 1853, p. 170.

SUB-FOSSIL REMAINS FROM KING ISLAND.

not somewhat small ones of introduced mainland birds, the two skins preserved in the British Museum belong to the same species of bird that laid the eggs referred to by Mr. Le Souëf. No adequate description of these skins has yet been published, but in view of the facts that (1) we know of eggs found in Tasmania that are distinct from those of the mainland form, and (2) that there are two authentically recorded skins of Emus from Tasmania that differ from those of the mainland bird, and differ also both in size and colour from those of the Bass Strait Islands, it appears to be certain that Tasmania was inhabited by an Emu distinct both from that of the Australian Continent and that of the Islands, and for this species when it is adequately described the name of *D. diemensis* may appropriately be retained.

In the following tables we give details of the measurements of the Femurs, Tibio-tarsal, and Tarso-metatarsal bones, the general results of which have been summarized in some of the foregoing tables :—

DROMÆUS MINOR.
Femur.

1	2	3	4	5	6	7	8	9	10	11	12
<i>r</i> 186	<i>l</i> 180	<i>r</i> 179	<i>r</i> 179	<i>l</i> 179	<i>r</i> 179	<i>r</i> 178	<i>r</i> 178	<i>l</i> 177	<i>l</i> 176	<i>l</i> 174	<i>l</i> 172·5
13	14	15	16	17	18	19	20	21	22	23	24
<i>r</i> 172	<i>r</i> 171	<i>l</i> 171	<i>l</i> 169·5	<i>r</i> 169	<i>r</i> 169	<i>r</i> * 169	<i>l</i> 169	<i>r</i> 168	<i>l</i> 168	<i>l</i> 168	<i>r</i> 167·5
25	26	27	28	29	30	31	32	33	34	35	36
<i>r</i> 167	<i>r</i> 166	<i>l</i> 162	<i>r</i> 161·5	<i>r</i> 161	<i>l</i> 161	<i>r</i> 160	<i>r</i> 160	<i>l</i> 160	<i>l</i> 160	<i>l</i> * 160	<i>r</i> 159
37	38	39	40	41	42	43	44	45	46	47	48
<i>r</i> * 159	<i>r</i> 158	<i>r</i> 158	<i>r</i> * 158	<i>l</i> 158	<i>l</i> 157	<i>l</i> 157	<i>l</i> 157	<i>r</i> 156	<i>l</i> 156	<i>r</i> 155	<i>r</i> 155
49	50	51	52	53	54	55	56	57	58	59	60
<i>r</i> * 155	<i>r</i> * 155	<i>l</i> 155	<i>l</i> 154	<i>r</i> 153	<i>l</i> 152	<i>r</i> 148	<i>r</i> 145·5	<i>r</i> 145 <i>juv.?</i>	<i>l</i> 145	<i>l</i> 145 <i>im.</i>	<i>r</i> * 142
61	62	63	64								
<i>l</i> 139 <i>juv.</i>	<i>r</i> 137 <i>im.</i>	<i>r</i> 132 <i>imm.</i>	<i>l</i> 130 <i>juv.</i>								

* Slightly broken.

SUB-FOSSIL REMAINS FROM KING ISLAND.

DROMÆUS MINOR—*continued.*

Tibio-tarsus.

1	2	3	4	5	6	7	8	9	10	11	12
<i>r</i> [*] 354	<i>r</i> [*] 338·5	<i>r</i> 333	<i>l</i> 328	<i>l</i> 318	<i>r</i> 315	<i>l</i> 314	<i>r</i> 311	<i>l</i> 309	<i>r</i> 305	<i>r</i> 303	<i>r</i> 302
13	14	15	16	17	18	9	20	21	22	23	24
<i>r</i> 301	<i>l</i> 300	<i>r</i> 297	<i>r</i> 290·5	<i>r</i> 290	<i>r</i> 288	<i>r</i> 288	<i>r</i> 287	<i>l</i> 287	<i>r</i> 285	<i>l</i> 285	<i>r</i> 284
25	26	27	28	29	30	31	32	33	34	35	36
<i>l</i> 283·5	<i>l</i> 283	<i>l</i> 282·5	<i>r</i> 281	<i>r</i> 280	<i>l</i> 278	<i>r</i> [*] 277	<i>l</i> 275·5	<i>r</i> 274	<i>l</i> 273	<i>r</i> 273	<i>r</i> 272
37	38	39	40	41	42						
<i>r</i> 272	<i>r</i> 271	<i>r</i> 271	<i>r</i> 268	<i>l</i> 266							

* Slightly broken.

Tarso-metatarsus.

1	2	3	4	5	6	7	8	9	10	11	12
<i>l</i> 292	<i>r</i> 278	<i>l</i> 278	<i>l</i> 277	<i>l</i> 271	<i>r</i> 265	<i>r</i> 264	<i>r</i> 253	<i>r</i> 252	<i>r</i> 249	<i>r</i> 249	<i>r</i> 247
13	14	15	16	17	18	19	20	21	22	23	24
<i>r</i> 247	<i>r</i> 246	<i>r</i> 245	<i>r</i> 245	<i>l</i> 245	<i>l</i> 243·5	<i>r</i> 242·5	<i>r</i> [*] 242	<i>l</i> 240	<i>r</i> 239	<i>r</i> 238	<i>l</i> [*] 238
25	26	27	28	29	30	31	32	33	34	35	36
<i>l</i> 236·5	<i>l</i> 236	<i>r</i> 235	<i>l</i> 235	<i>r</i> 234	<i>r</i> 233·5	<i>r</i> 233·5	<i>r</i> 233	<i>r</i> 233	<i>l</i> 233	<i>l</i> 232·5	<i>r</i> 232·5
37	38	39	40	41	42	43	44	45	46	47	48
<i>r</i> 232	<i>r</i> 232	<i>r</i> 232	<i>r</i> 232	<i>l</i> 231·5	<i>l</i> 231·5	<i>l</i> 231·5	<i>r</i> 230	<i>r</i> 229	<i>r</i> 228·5	<i>l</i> 228	<i>l</i> 228
49	50	51	52	53	54	55	56	57	58	59	60
<i>l</i> 227	<i>r</i> 225	<i>l</i> 224·5	<i>r</i> 224	<i>r</i> 223	<i>l</i> 222	<i>l</i> [*] 220	<i>r</i> 220	<i>l</i> 219	<i>r</i> 218·5	<i>r</i> 218	<i>r</i> 218
61	62	63	64	65	66	67	68	69	70		
<i>l</i> 216·5	<i>l</i> 216	<i>r</i> 215	<i>r</i> 214	<i>r</i> 213·5	<i>l</i> 212	<i>r</i> 211	<i>r</i> 199	<i>l</i> 199	<i>r</i> 174·5		

* Slightly broken.

In consequence of the large series of remains secured since the original description was published it is necessary to alter the diagnosis then given :—

DROMÆUS MINOR.

Size varying considerably, but always much smaller than that of *D. novæ-hollandiæ* : not exceeding that of *D. peroni*, but of more robust build. Tibio-tarsus rarely exceeding 330 mm., most usually from 270-320 mm. in greatest length. Tarso-metatarsus rarely exceeding 280 mm., most usually from 220-280 mm. in greatest length. Frontal region of skull decidedly dome-shaped. Length of skull from frontal suture to occiput not or only slightly exceeding 60 mm. Greatest width of skull not or only slightly exceeding 55 mm.

Habitat. King Island. Bass Strait. Now extinct.

PHASCOLOMYS URSINUS, SHAW.

In a separate paper we deal at length with the question of the different species of Phascalomys, popularly known as Wombats, that have been recorded from Australia, Tasmania, and the Islands of Bass Strait. It will suffice to say here that the earliest known Wombat was secured on Clarke Island, in Bass Strait, and taken alive to Sydney in 1797. There is no record of the name of its discoverer.* After lingering in captivity for six weeks it died; and in August of that year Hunter, then Governor of New South Wales, sent the body together with a description of the animal to the Newcastle Philosophical Society. † In 1800 Shaw ‡ published a brief description of this animal under the name of *Didelphys ursina*. Up to this year, and indeed until at the earliest 1802, the only Wombat known in England was the one sent home by Hunter. Bass found his specimen on Cape Barren Island in 1799, but no description of this was published until 1802.

There can be no doubt whatever that all the early descriptions of Phascalomys were based upon specimens from the Islands of Bass Strait, and further still that without any adequate investigation it was taken for granted that the Bass Strait Island species was identical with the Tasmanian. Our collection from the Bass Strait Islands includes eight skulls, thirty lower jaws, and two skins, and after a careful comparison of these with fourteen skulls from Tasmania, and a large number from Australia, we have come to the conclusion that the Bass Strait Island form is quite distinct from that of Victoria and Tasmania, and that as already

* It is generally stated that the first Wombat taken to Sydney was captured by Bass, but this is not so.

† In Bewick's "History of Quadrupeds," 4th edit. 1800, p. 225, Hunter's letter is quoted in full, and a quaint figure of the animal, which is called "The Wombach," is given.

‡ "General Zoology" i., pt. 2, p. 504.

described the two latter are also distinct from one another, though at the same time they are more closely allied than is the Bass Strait Island Wombat to either of them.*

It is therefore necessary to distinguish specifically the two forms which up to the present time have been united under the name of *Phascalomys ursinus*. As this was, without any doubt, applied in the first instance to the particular form secured on Clarke Island, sent to England by Hunter, and named *Didelphys ursina* by Shaw, we retain the specific name *ursinus* for the Bass Strait Island species, and redescribe the distinct Tasmanian species under the name of *Ph. tasmaniensis*.

It is an interesting fact that the first reliable drawings of a Wombat, those in the Atlas to Péron's work represent the King Island species, and further that one of the earliest descriptions of the anatomy of any species of the genus was based upon a specimen taken to London by the distinguished naturalist, R. Brown, who secured it on one of the Bass Strait Islands.† Sir Everard Home, when describing the anatomy of this specimen, says that it lived in captivity with him for two years, and "It appeared to have arrived at its full growth, weighed about twenty pounds, and was about two feet two inches long."

In addition to the sub-fossil specimens from King Island our original collection included a skull from Deal Island, indistinguishable from the King Island skulls. For the purpose of procuring, if possible, material from the Furneaux Group, of which Clarke Island, the habitat of the first found Wombat, forms a part, one of us paid a visit to Flinders Island, the largest of the group, and made the interesting discovery that the small Wombat, though rare, is not yet actually extinct. Further reference to this is made in a separate article. Here it will suffice to say that the Deal, Flinders and King Island skulls are identical. Deal, Flinders, Clarke, and Cape Barren Islands, form parts of a chain of islands stretching across the eastern entrance to Bass Strait, whilst King Island lies far away on its western margin. It would be, at least, a most curious thing if the Deal, Flinders, and King Island wombats were identical, as they are, and at the same time distinct from those of Clarke and Cape Barren Islands.

We have therefore decided to retain Shaw's specific name *ursinus* for the Wombat of the Bass Strait Islands. Though much has been written about it, and it is the oldest known species, it has for many years been confused with the quite distinct Tasmanian form, and it is doubtful if any well authenticated skin of it is in existence, except two recently secured on Flinders Island.

* It is a somewhat remarkable fact that both the King Island Emu and Wombat are more distinct from the mainland and Tasmanian forms than the two latter are from one another.
 † Home. Phil. Trans., 1808, p. 304. "An account of some Peculiarities in the anatomical structure of the Wombat, &c."

Unfortunately Hunter in his letter to the Newcastle Philosophical Society, when sending to England the original specimen on which Shaw established the species, gave only a very vague description of it, nor does that specimen appear to have ever been adequately described.

Collins, however, published a more detailed account of the specimen obtained by Bass on Cape Barren Island, though in his account, which undoubtedly refers to this particular species of Wombat,* there is a curious error in regard to the dentition which must have arisen in consequence of a mistake in the transcription of notes. Taking Bass' account of the external form and combining it with the results obtained from the investigation of the skulls from King, Deal, and Flinders Islands, and skins from the latter, the following may be taken as a fairly accurate description of this species :—

PHASCOLOMYS URSINUS. SHAW.

Size, smallest of the genus. Length, from tip of tail to tip of nose, about 775 mm.† Length of head, 175 mm. Weight, from twenty-five to thirty pounds. The female slightly larger than the male. Hair coarse, light sandy brown in colour, darkest along the back. Ears sharp and erect, about 57 mm. long. Eyes about 60 mm. apart. Muzzle naked. The fore legs strong and muscular, their length to the sole about 130 mm. The three middle claws 20 mm. in length, claws of first and fifth digits 15 mm. in length. The three inner claws of the foot about 5 mm. longer than the longest of the fore claws. Skull smaller than that of the Australian or Tasmanian species. Basal length, 120-132 mm. Greatest breadth 99-106 mm. Nasals much expanded posteriorly, their greatest breadth at least three-fourths of their length. Post-orbital processes small. The malar bones strongly bowed downwards and outwards below the orbit. Length of upper molar tooth series not exceeding 45 mm. ; that of the lower tooth series not exceeding 46 mm. Length of humerus 98 mm. Greatest width of humerus at its distal end 42 mm. Length of femur, 125 mm.

Habitat.—King, Deal, Cape Barren, Clarke, and Flinders Islands in Bass Strait.

Type specimen is the one sent to Newcastle by Hunter. It is doubtful whether it is now in existence.

DASYURUS BOWLINGI. SP. N.

When describing the fauna of King Island,‡ Péron says, " Nous y avons recueilli, M. Lesueur et moi, une foule d'espèces inconnes à l'Europe, parmi lesquelles se trouvent deux Dasyures élégans.

* "An account of the English colony of New South Wales." 2nd Edit. 1804, p. 469.

† This may probably be regarded as the maximum. Of two skins from Flinders Island, one, a mature male, measures 715 mm., the other, a female, not quite complete, as the tip of the snout is wanting, measures 675 mm.

‡ Voyage de découvertes, etc., p. 12.

&c.” In speaking of Kangaroo Island he says,* “ Nous y avons vu que trois espèces de mammifères : l'une appartient au joli genres des Dasyures,” and in connexion with the latter refers to a plate on which two Dasyures are drawn, the title of the plate being as follows :—“ Nouvelle-Hollande : Nouvelle Galles du Sud. Dasyure à longue queue (*Dasyurus Macrourus*, Geof.).”

It is evident that Péron regarded the Kangaroo Island species as identical with the larger mainland form now known as *Dasyurus maculatus*, but he says nothing with regard to the two King Island species, and does not appear to have collected specimens.

At the present two species of *Dasyurus* are known from Victoria and Tasmania, a somewhat larger form, *D. maculatus*, and a somewhat smaller one, *D. viverrinus*. Both of these are found in Victoria and Tasmania, the first-named species being more abundant in the island than on the mainland. During the visit of the Field Naturalists' Club in 1887, *D. maculatus* was reported as existing on King Island, but not *D. viverrinus*.

Our collection of bones includes the remnants of twenty-five crania, and sixty lower jaws, one of which came from Deal Island. No trace of any other bone could be found.

The crania and jaws are clearly divisible into two sets, a larger and a smaller, indicating the existence of two species as recorded by Péron, who, unfortunately, gave no indication of their relative size. The question arises as to the relationship of these two species to those now existing in Anstralia and Tasmania. In our collection, twenty-one of the crania belong to the larger form, and four only to the smaller. Of the lower jaws, thirty-seven appear to belong to the larger, and twenty-nine to the smaller. The difference in size is not due to immaturity, the dentition of both series being the permanent one.

In order to try and decide the relationship of the fossil forms, we have made a considerable number of measurements of skulls and lower jaws of recent specimens, the results of which are given in the following tables.

In the following table the crania of the King Island specimens, and of a series of specimens of *D. maculatus* and *D. viverrinus* are grouped in accordance with their basal lengths :—

Basal length.	MM.							
	60-70.	70-80.	80-90.	90-100.	100-105.	105-110.	110-115.	115 & over.
King Island species	...	...	2	1	1	3	6	3
<i>D. maculatus</i>	...	1	3	4	...	...	...	...
<i>D. viverrinus</i>	7	1	...	...	...	...	...	...

* Soc. cit. p. 76. Pl. 63.

SUB-FOSSIL REMAINS FROM KING ISLAND.

The greatest basal length of any of our specimens of *D. maculatus* is 98 mm., and that particular specimen came from Queensland; a second, measuring 97 mm., from Tasmania; a third, measuring 96 mm., from Victoria; are particularly large ones. In the British Museum catalogue the basal length of one is given as 101, but this, as well as the above three, may be regarded as decidedly above the average size. Even if we take 100 mm. as the basal length of *D. maculatus*, the above table still shows very clearly the great relative size of the King Island species.

In the following tables the same species are grouped in accordance with their tooth measurements :—

LENGTH MOLARS 1-3.—UPPER JAW.

		MM.							
		14-15.	15-16.	16-17.	17-18.	18-19.	19-20.	20-21.	21-22.
King Island species	...	...	...	...	...	...	4	17	2
<i>D. maculatus</i>	...	...	...	...	...	6	6	...	...
<i>D. viverrinus</i>	...	2	6	...	...	...	...	...	...

LENGTH MOLARS SERIES—LOWER JAW.

		MM.										
		18-19.	19-20.	20-21.	21-22.	22-23.	23-24.	24-25.	25-26.	26-27.	27-28.	28-29.
King Island species	...	...	...	...	...	...	...	8	10	6	13	2
<i>D. maculatus</i>	...	...	...	...	...	...	6	4	1	...	...	...
<i>D. viverrinus</i>	...	4	4	..	...	...	..	...	...	...	...	...

LENGTH OF UPPER p³.

		MM.						
		3-3.5.	3.5-4.	4-4.5.	4.5-5.	5-5.5.	5.5-6.	6 & above.
King Island species	...	...	...	1	7	10	2	3
<i>D. maculatus</i>	...	...	...	9	3	...	...	...
<i>D. viverrinus</i>	...	4	4	...	...	...	...	...

LENGTH OF LOWER p³.

		MM.						
		3-3.5.	3.5-4.	4-4.5.	4.5-5.	5-5.5.	5.5-6.	6 & above.
King Island species	...	...	...	6	11	16	5	2
<i>D. maculatus</i>	...	...	...	6	5	1	...	...
<i>D. viverrinus</i>	...	2	5	1	...	...	...	...

The measurements in the first place show unmistakably that *D. viverrinus* is not represented amongst the remains.

They equally clearly indicate the existence of a species decidedly larger than the existing *D. maculatus*, and at the same time prove the existence of animals of a size equal to that of large examples of *D. maculatus*. The question then arises as to whether the smaller King Island specimens are to be regarded as females of the larger form or as representatives of another species, that is *D. maculatus*. We incline to the latter opinion which, moreover, is in accordance with the definite statement made by Péron that two species existed on the island.

A reference to Plate 8, Figs. 2 and 3, representing a larger and smaller specimen will serve to show how distinct the forms are, and though, of course, the smaller amongst the larger forms tend to merge into the larger amongst the smaller, yet an examination of the collection as a whole unmistakably gives the impression that it contains the remains of two distinct forms.

The evidence from the teeth is as decisive as that from the basal length of the skull. In no example of *D. maculatus* does the length of the upper first three molar teeth exceed 19.5 mm.; in the large island specimens it is consistently 20 mm. or more, and the same difference is seen in the length of the lower molar series and of both the upper and lower pre-molar.

But beyond these measurements there is fortunately one structure in the skull which both serves still further to mark the larger form out as a distinct species and at the same time bears evidence in favour of the fact that the smaller island form is *D. maculatus*. Two of the larger and two of the smaller skulls fortunately have the mastoid bullæ sufficiently intact to show clearly what was its size. In *D. viverrinus* this is very largely inflated, the breadth of the bulla being at least three-quarters the length; in *D. maculatus* the expansion of the bulla is not so great, the breadth being slightly more than half the length. When we examine the King Island specimens (Figs. A, B, C,) we find that in



FIG. A.
D. bowlingi.



FIG. B.
D. maculatus.



FIG. C.
D. viverrinus.

the large ones the bulla is decidedly more elongate and much less swollen, whilst in the smaller ones it is similar to that of *D. maculatus*. In a large island form with a basal length of

117 mm. the width of the bulla is 6 mm. ; in a small island form with a basal length of 87.5 mm., the width is 6 mm., and in a *D. maculatus*, with a basal length of 91 mm., the width is 6.5 mm.

Taking everything into account we are of opinion—first, that the *Dasyurus* remains include those of two species ; secondly, that the larger of these two is distinct from any yet described ; and, thirdly, that the smaller form is identical with *D. maculatus*.

It is of course possible that the larger species may still exist in some of the wilder and more inaccessible parts of the island, but it is much to be feared that, like the small Wombat and the Emu, it is now quite extinct, and will only be known from its sub-fossil remains.

We describe it as follows, and associate with it the name of Mr. J. McKie Bowling, to whose assistance in securing these remains from King Island we are much indebted.

DASYURUS BOWLINGI. SP. N.

Size, considerably larger than *D. maculatus*. Basal length of skull, 105 mm. or more. Length of upper first three molars, 20 mm., or more ; and of lower molar series, 25 mm., or more. Bullæ much less swollen than in *D. maculatus*, and more obliquely elongate, their length decidedly more than twice their width, and their height, measured vertically above the glenoid surface, not or only slightly exceeding 5 mm.

Habitat.—King Island.* Extinct.

Type (skull) in the National Museum, Melbourne.

* A lower jaw from Deal Island, with a measurement of 26 mm. for the molar series, and part of a cranium, probably indicate the former existence there of this larger species of *Dasyurus*.

DESCRIPTION OF PLATES.

PLATE 1.

View of sand-blow at Seal Bay, King Island, where the majority of the specimens were obtained. Fragments of bones can be seen in the foreground. From a photograph taken by Mr. C. L. Barrett.

PLATE 2.

- Fig. 1. Left Femur, *D. novæ-hollandiæ*. 238 mm.
- Fig. 2. Left Femur, *D. minor*. 180 mm.
- Fig. 3. Femur, *D. minor*. 158 mm.
- Fig. 4. Left Femur, *D. minor*. 156 mm.
- Fig. 5. Right Femur, *D. minor*. 186 mm.
- Fig. 6. Left Femur, *D. minor*. 171 mm.
- Fig. 7. Left Femur, *D. minor*. 160.

PLATE 3.

A series of bones showing variations in size of the Tibio-tarsus, and a comparison of this with the same bone in *Dromæus novæ-hollandiæ* and *D. peroni*.

- Fig. 1. Right Tibio-tarsus, *D. minor*. 338 mm. (broken, probably 25 mm. longer).
- Fig. 2. Right Tibio-tarsus, *D. minor*. 333 mm.
- Fig. 3. Left Tibio-tarsus, *D. minor*. 328 mm.
- Fig. 4. Left Tibio-tarsus, *D. minor*. 314 mm., slightly broken.
- Fig. 5. Right Tibio-tarsus, *D. minor*. 315 mm.
- Fig. 6. Right Tibio-tarsus, *D. minor*. 301 mm.
- Fig. 7. Left Tibio-tarsus, *D. peroni*. 276 mm., broken.
- Fig. 8. Left Tibio-tarsus, *D. minor*. 283 mm., slightly broken.
- Fig. 9. Right Tibio-tarsus, *D. novæ-hollandiæ*. 447 mm.
- Fig. 10. Left Tibio-tarsus, *D. novæ-hollandiæ*. 447 mm.
- Fig. 11. Fibula, *D. minor*.
- Fig. 12. Fibula, *D. minor*.

PLATE 4.

Figs. 1-12 show the variations in size of the Tarso-metatarsus, and a comparison of this in *Dromæus minor* with the same bone in *D. novæ-hollandiæ* and *D. peroni*.

- Fig. 1. Right Tarso-metatarsus, *D. novæ-hollandiæ*. 395 mm.
- Fig. 2. Left Tarso-metatarsus, *D. minor*. 292 mm.
- Fig. 3. Right Tarso-metatarsus, *D. minor*, 278 mm.
- Fig. 4. Left Tarso-metatarsus, *D. minor*. 278 mm.
- Fig. 5. Right Tarso-metatarsus, *D. minor*. 265 mm.
- Fig. 6. Left Tarso-metatarsus, *D. minor*. 253 mm.
- Fig. 7. Right Tarso-metatarsus, *D. minor*. The specimen is immature. 242 mm.
- Fig. 8. Left Tarso-metatarsus, *D. minor*. 245 mm.
- Fig. 9. Left Tarso-metatarsus, *D. peroni*. 237 mm.
- Fig. 10. Left Tarso-metatarsus, *D. minor*. The specimen is immature. 231.5 mm.
- Fig. 11. Left Tarso-metatarsus, *D. minor*. 232 mm.
- Fig. 12. Left Tarso-metatarsus, *D. minor*. 218 mm.
- Fig. 13. Middle Toe Bone, *D. novæ-hollandiæ*.
- Fig. 14. Middle Toe Bone, *D. minor*.
- Fig. 15. Middle Toe Bone, *D. minor*.
- Fig. 16. Rib, *D. novæ-hollandiæ*.
- Fig. 17. Rib, *D. minor*.
- Fig. 18. Rib, *D. minor*.
- Fig. 19. Pectoral Girdle without the Clavicle, *D. novæ-hollandiæ*.
- Fig. 20. Pectoral Girdle without the Clavicle, *D. minor*.

PLATE 5.

- Fig. 1. Pelvis of *Dromæus novæ-hollandiæ*. Length 423 mm.
- Fig. 2. Pelvis of *Dromæus minor*. Broken specimen, showing the proximal parts of the pubis and ischium.
- Fig. 3. Pelvis of *Dromæus minor*. Length 285 mm.
- Fig. 4. Pelvis of *Dromæus minor*. Length 295 mm.
- Fig. 5. Pelvis of *Dromæus minor*. Length 276 mm.

PLATE 6.

- Fig. 1. Upper view of cranial portion of skull of *D. minor*.
Fig. 2. Upper view of cranial portion of another specimen of *D. minor*.
Fig. 3. Hind view of skull shown in Fig. 1.
Fig. 4. Hind view of skull shown in Fig. 2.
Figs. 5 and 6. Side views of skulls of *D. minor*, showing clearly the domed nature of the skull as compared with that of *D. novæ-hollandiæ*.
Fig. 7. Upper view of the cranial portion of the skull of *D. minor* with the pre-maxilla approximately in its proper relative position.
Fig. 8. Upper view of skull of adult *D. novæ-hollandiæ*.
Fig. 9. Side view of skull of immature *D. novæ-hollandiæ*. The frontal bone of the right side is removed.

PLATE 7.

- Fig. 1. Ventral view of sternum of *Dromæus novæ-hollandiæ*.
Fig. 2. Ventral view of sternum of *D. minor*.
Fig. 3. Side view of sternum of *D. minor*.
Fig. 4. Dorsal view of sternum of *D. minor*.

PLATE 8.

- Fig. 1. Dorsal view of skull of *Dasyurus bowlingi*.
Fig. 2. Dorsal view of skull of *Dasyurus bowlingi*.
Fig. 3. Dorsal view of skull of *Dasyurus maculatus*.
Fig. 4. Side view of lower jaw of *Dasyurus bowlingi*.
Fig. 5. Side view of lower jaw of *Dasyurus bowlingi*.
Fig. 6. Side view of lower jaw of *Dasyurus maculatus*.



